ORIGINAL ARTICLES

BARANY'S INVESTIGATION ON LOCALIZATION IN THE CEREBELLUM.*

By KASPAR PISCHEL, M. D., San Francisco.

Though the physiology and the functions of the semicircular canals had been well described by Ewald twenty years ago it was Barany who put the results of these researches to practical use for clinical diagnosis of labyrinth affections. Lately he has gone still further in his research and is trying to solve the question about the functions of the cerebellum. He thinks he has succeeded in localizing the centers for certain movements of the upper extremities. Permit me to cite from a recent address which he has not yet published:

"If in a normal person a horizontal nystagmus to the right has been created either by syringing the left ear with cold water or by turning the patient, with head erect, several times to the left on a revolving chair and stopping him suddenly, there appears besides the nystagmus, a vestibular innervation of almost all voluntary muscles.

"If the patient is asked to walk straight ahead he deviates to the left; in my pointing test he will miss to the left. The pointing test is made as follows: the patient with his eyes closed touches my finger with his index finger. He is then asked to lower his arm and raise it again to my finger. During the nystagmus he will miss to the left. By means of the pointing test it can be proven that the muscles of the head, of the body and of the extremities are all under the vestibular influence. In diseases of the cerebellum (abscesses, tumors, serious meningitis on the surface of the cerebellum) I could demonstrate a lack of these normal pointing reactions.

"In a lesion of that surface of the cerebellum on the right side, which faces the posterior surface of the pyramid, the reaction of the right arm to the left is missing during a nystagmus to the right, while all the other pointing reactions are intact.

"I could prove these facts by the physiological experiment on man.

"The dura of the cerebellum is sometimes exposed in mastoid operations and after the wound is healed it may be covered by a thin skin only, so that the pulsation of the brain can be seen and felt.

"In such cases I could produce a temporary cessation of the reaction to the left of the right arm by cooling the surface just behind the ear. I have made this experiment twenty times with the same result and demonstrated it at several medical meetings."

The one case was that of an eleven-year-old boy on whom a large extradural abscess of the left posterior fossa had been opened. Thin skin only covered the cerebellum. After freezing this part with ethyl-chloride for three minutes the left arm missed in the pointing test to the left and when nystagmus to the left was produced, the left arm did not miss to the right, while the right arm showed typical missing to the right.

"These cases," writes Barany, "prove conclusively that the center for the innervation of the arm for the inward movement is in the outer upper third of the lower surface of the cerebellum." In the neighborhood, farther in front is the center for the movement in the elbow and wrist.

Numerous observations have let Dr. Barany draw the conclusion that the representation of the muscles is arranged in the cerebellum according to joints and direction of movements. Each direction of movement is represented once, every joint and each muscle is represented in one hemisphere at last four times. Each hemisphere is connected with the extremities of the same side. The practical value of this work has been shown in a number of cases. I will cite the following:

The patient was totally blind; when trying to stand upright fell backwards. Ophthalmic examination revealed papillitis in both eyes, nystagmus to the right and left at the end position; when the head is bent to the left rotary nystagmus to the left; when it is bent to the right rotary nystagmus to the right. Drums appeared normal, hearing normal, sensibility normal. By the functional examination of the vestibular apparatus, respectively of the cerebellum according to Barany's method, a tumor of the cerebellum could be excluded. When the right ear was syringed with cold water enormous nystagmus to the left appeared without dizziness. The patient missed with both arms enormously to the right and fell to the right. When the head was turned to the left he fell forward; a similar result was produced by syringing the left ear. He therefore had found that there was a heightened irritability of the vestibular apparatus and the cerebellum but no cessation of the reactions.

A post mortem showed a large gliosarcoma of the left frontal lobe.

Barany's method of examination in this case prevented the wrong diagnosis.

In conclusion I would like to cite from another paper:

"The spontaneous missing may have two foundations, it can be a sign of irritation or a sign of paralysis. The examination of the functions will show the difference; if a patient misses with the right arm to the right, but misses to the left as long as I artificially cause a nystagmus to the right we have to deal with the symptoms of irritation and not of paralysis (right center); but if a patient misses spontaneously to the right and even during an artificial nystagmus to the right still misses to the right we have to deal with paralysis (left center). In the first case the center is irritated, which produces a missing to the right; in the second case the center for missing to the left is paralyzed, therefore the center for the missing to the right predominates. We may imagine that the movement of the arms is controlled by two reins. These two reins represent the cerebellar

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innervation. If they are equally taut there is no missing; but if the right side is drawn more taut we have missing to the right. This would equal a cerebellar irritation of the center for the movement to the right; if the left side is cut the right side will naturally predominate and we have a missing to the right. In the latter case we have to deal with a paralytic symptom of the center of the movement to the left." (From Wiener Medizinische Wochenschrift, No. 34, 1911.)

Discussion.

Dr. H. B. Graham: The pointing symptoms to which Dr. Pischel has referred are simply a portion of a group of symptoms that have been worked on for a good while by a number of men. Probably the most noted is Von Stein. He has not gone into the pointing symptoms especially, but has worked more on the general disturbances of equilibrium—he has worked out the Romberg in connection with the vestibular tract as Barany has the disturbances of pointing, which, of course, belong to this group of general disturbances of equilibrium, whether in feet, body, or legs. Von Stein's work is, I think, most interesting. He has constructed a goniometer by which he measures a person's ability to keep in an erect position during cerebellar affections. He has also worked out the ability of a man to hold his erect position in relation to different colors on the wall. For instance, if one places a man with certain cerebellar disturbances in front of a red wall, he acts differently than when in front of a green, blue, white, black or orange wall. Barany's work on these pointing symptoms of the arm, shoulder, leg, wrist, feet and knee were pretty well worked out when I was in Vienna. The data which Dr. Pischel has given was, I believe, presented in London before the British Medical Association. They are extremely interesting, but at times confusing because, possibly, of inaccuracies in observation and application. I have seen some cases here with Dr. Schaller, which have not worked out entirely satisfactorily. I diagnosed one or two cases as cerebellar affections from errors in pointing, and found that afterward the error disappeared. One or two made changes in these pointing movements which I had not expected. Whether Barany has published anything of that character, I do not know; I have not seen anything. He may be running into some difficulties but is saying nothing about them until they are more completely investigated, as so many who publish discoveries are apt to do. Barany told me he was encountering irregularities, and I have also found these difficulties and have not known how to explain them. Whether actual errors in my acuteness of observation, or whether errors in the principle on which he works, I do not know. Horsley was certainly interested in Barany's work, and a number of his cases were examined by Barany before and after operation, and were correctly diagnosed, which is a strong argument in favor of Dr. Barany's work. The pointing to right and left has been demonstrated by Barany on cases operated for mastoid disease when the posterior fossa was exposed and the cerebellar surface frozen; he found that certain areas governed certain joints, and that errors in pointing were produced by freezing these areas. I would advise anybody interested in this work to take up the subject as a whole and work it out, and not to pay attention to one man's work in contradistinction to all others.

Dr. W. F. Schaller: At the Relief Home there is a case of cerebellar disease in which I mean to try these tests in the near future. In a case of cerebellar lesion (softening) of the left cerebellar hemisphere, which came to autopsy, there was no spontaneous nystagmus or errors in pointing. We have no rotary stool at the Relief Home, and I regret that I delayed until too late to make the examination at the clinic. I believe that this would have been a very instructive case in the light of Barany's tests. A correct diagnosis and localization was made, however, in this instance without their aid.

GENERAL ANESTHESIA IN CATARACT WORK.*

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None of the text-books on ophthalmology give as much space to the discussion of this subject as its importance demands. Some authorities do not mention it at all, now and then a writer may recommend it for more general adoption, others condemn it absolutely excepting in the case of children and adults known to be wholly irresponsible. Concerning its use in these two classes there can, of course, be no difference of opinion. It is interesting to note that one author of broad experience says that he has never done a cataract operation under general anesthesia, while another operator reports having extracted the cataracts from both eyes at one operation under chloroform anesthesia with excellent results in each eye.

The most skillful cataract operator cannot obtain satisfactory results unless he has an obedient patient and reasonable control of the eye during the entire procedure. All of us have had or have seen unsatisfactory eyes following cataract extraction due only to the bad action of the patient at the time of the operation, a considerable loss of vitreous having been sustained or the proper replacement of the iris and a satisfactory "toilet of the eye" having been interfered with.

The operator is to a large extent at the mercy of his patient and, for my part, the anxiety accompanying a cataract operation under local anesthesia cannot be duplicated. When, in addition, the dread and apprehension of the average cataract patient is considered our wonder increases at the large percentage of useful eyes obtained under a local anesthetic. Again, when the operator confidently expects good behavior upon the part of the patient there can be no question as to his preference for local anesthesia in that case, though this confidence may be sadly misplaced. For instance, on October 16th, last year, I extracted a senile cataract from the left eye of a patient whose actions on this occasion were perfect, but when I operated upon her right eye on November 23rd following, under precisely the same condition, my confidence in the good behavior of the patient was unquestioned yet she then proved to be the prize "bad actor," and while the first eye would have been a credit to a master operator the second eye in appearance now would disgrace an awkward tyro.

A satisfactory general anesthetic for cataract work would practically eliminate the personal equation of patients, obviate their mental suffering and abolish the operator's anxiety and apprehension over things he realizes cannot be controlled.

* Read before the Forty-Second Annual Meeting of the State Society, Del Monte, April, 1912.